



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,941	12/23/2003	Hui-Ling Lou	MP0354	9405
26703 7590 09/27/2007 HARNESS, DICKEY & PIERCE P.L.C. 5445 CORPORATE DRIVE SUITE 200 TROY, MI 48098			EXAMINER BURD, KEVIN MICHAEL	
			ART UNIT 2611	PAPER NUMBER
			MAIL DATE 09/27/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/743,941

Applicant(s)

LOU ET AL.

Examiner

Kevin M. Burd

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-138 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-138 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

1. This office action, in response to the remarks filed 8/6/2007, is a final office action.

Response to Arguments

2. Applicants' arguments filed 8/6/2007 have been fully considered but they are not persuasive. Applicants state Walton fails to at least show, teach or suggest a link adaptation module that dynamically adjusts bandwidth. The examiner disagrees. Merriam Webster defines bandwidth as the capacity for data transfer of an electronic communications system, the maximum data transfer rate of such a system. A copy of Merriam-Webster's On-line definition of bandwidth is provided in this office action. Walton discloses the data rate is indicative of the maximum data rate that may be transmitted on the transmitted channel for the required level of performance in paragraph 0208. Walton further discloses adding redundancy and selecting coding and modulation schemes to meet the required level (target level) of performance in paragraph 0232. The addition of redundancy and the selection of the coding and modulation schemes to maintain the required level of performance will change the capacity for data transfer in the communication system (dynamically adjust the bandwidth). As stated in the previous office action, Walton discloses a link adaptation module that dynamically adjusts the specific coding and modulation schemes of the wireless communications device based on a transmission error rate and a correlation measurement at the remote wireless communication device (paragraphs 0227, 0230 and 0232).

For these reasons and the reasons stated in the previous office action, the rejections of the claims are maintained and stated below.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 25-30, 32-39, 41-45, 47-55, 57-69, 71-76, 78-85, 87-91, 93-101, 103-115, 117-122, 124-131 and 133-137 are rejected under 35 U.S.C. 102(e) as being anticipated by Walton et al (US 2005/0002468).

Regarding claims 25, 42, 43, 47, 65-67, 71, 88, 89, 93, 111-113, 117, 134 and 135, Walton discloses a wireless communication device and method of using the device in a MIMO system shown in figures 1-3. The device comprises multiple antennas (figures 1-3) and a link adaptation module that dynamically adjusts the specific coding and modulation schemes of the wireless communications device based on a transmission error rate and a correlation measurement at the remote wireless communication device (paragraphs 0227, 0230 and 0232).

Regarding claims 26, 29, 48, 49, 54, 72, 75, 94, 95, 100, 118, 119 and 121, Walton discloses receiving the channels SNR and determining the coding and modulation scheme from that received value (paragraph 0232).

Regarding claims 27, 50-52, 73 and 96-98, Walton discloses receiving the SNR of the channels and adjusting the coding and modulation scheme accordingly (paragraphs 0227, 0232 and table 2).

Regarding claims 28, 53, 74, 99, 120, Walton discloses the MIMO system employs various forms of spatial diversity (paragraph 0029) and discloses switching between different communication modes (paragraph 0030). The different communication modes include a MIMO mode and a diversity mode that is determined when data rate requirements are low or when the SNR is low (paragraph 0030). Walton further discloses space-time processing (paragraph 0060).

Regarding claims 30, 55, 76, 101 and 122, Walton discloses ranking the SNR values received and further decoding these signals to recover the transmitted data (paragraph 0061).

Regarding claims 32, 57, 78, 103 and 124, Walton discloses receiving the signal power of the received signal (paragraph 0203).

Regarding claims 33, 58, 79, 104 and 125, Walton discloses receiving a SNR value and adjusting the coding and modulation scheme accordingly.

Regarding claims 34, 36, 59, 61, 80, 82, 105, 107, 126 and 128, Walton discloses as the SNR increases the modulation scheme becomes more robust (table 2).

Regarding claims 35, 37-39, 41, 44, 60, 62-64, 68, 81, 83-85, 87, 90, 106, 108-110, 114, 127, 129-131, 133 and 136, Walton discloses the MIMO system employs various forms of spatial diversity (paragraph 0029) and discloses switching between different communication modes (paragraph 0030). The different communication modes include a MIMO mode and a diversity mode that is determined when data rate requirements are low or when the SNR is low (paragraph 0030).

Regarding claims 45, 69, 91, 115 and 137, Walton further discloses space-time processing (paragraph 0060).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-9, 11-24, 40, 46, 70, 86, 92, 116, 132 and 138 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al (US 2005/0002468) in view of Edwards et al (US 2004/0059825).

Regarding claims 1 and 19-21, Walton discloses a wireless communication device for a MIMO system shown in figures 1-3. The device comprises multiple antennas (figures 1-3) and a link adaptation module that dynamically adjusts the specific coding and modulation schemes of the wireless communications device based on a transmission error rate and a correlation measurement at the remote wireless

communication device (paragraphs 0227, 0230 and 0232). Walton does not disclose the link adaptation module is found in a MAC device. Edwards discloses medium access control in a wireless network. A link quality assessment process uses MAC based hardware components and works in the MAC layer. It is effective with any target station and should have an insignificant effect on data throughput (paragraph 0084). Software MAC components also determine the transmit power and data rate at which the link is viable (paragraph 0083). For these reasons, it would have been obvious for one of ordinary skill in the art at the time of the invention to utilize the MAC layer device disclosed by Edwards in the device of Walton.

Regarding claims 2, 3 and 8, Walton discloses receiving the channels SNR and determining the coding and modulation scheme from that received value (paragraph 0232).

Regarding claims 4-6, Walton discloses receiving the SNR of the channels and adjusting the coding and modulation scheme accordingly (paragraphs 0227, 0232 and table 2).

Regarding claims 7, 14, 16-18 and 22, Walton discloses the MIMO system employs various forms of spatial diversity (paragraph 0029) and discloses switching between different communication modes (paragraph 0030). The different communication modes include a MIMO mode and a diversity mode that is determined when data rate requirements are low or when the SNR is low (paragraph 0030). Walton further discloses space-time processing (paragraph 0060).

Regarding claim 9, Walton discloses ranking the SNR values received and further decoding these signals to recover the transmitted data (paragraph 0061).

Regarding claim 11, Walton discloses receiving the signal power of the received signal (paragraph 0203).

Regarding claim 12, Walton discloses receiving a SNR value and adjusting the coding and modulation scheme accordingly.

Regarding claims 13 and 15, Walton discloses as the SNR increases the modulation scheme becomes more robust (table 2).

Regarding claim 23, Walton further discloses space-time processing (paragraph 0060).

Regarding claims 24, Edwards discloses the use of the MAC device in an 802.11 network (paragraphs 0083 and 0084).

Regarding claims 40, 46, 70, 86, 92, 116, 132 and 138, Walton discloses a device as stated above in paragraph 1. Walton does not disclose the link adaptation module is found in a MAC device. Edwards discloses medium access control in a wireless network. A link quality assessment process uses MAC based hardware components and works in the MAC layer. It is effective with any target station and should have an insignificant effect on data throughput (paragraph 0084). Software MAC components also determine the transmit power and data rate at which the link is viable (paragraph 0083). Edwards discloses the use of the MAC device in an 802.11 network (paragraphs 0083 and 0084). For these reasons, it would have been obvious for one of

ordinary skill in the art at the time of the invention to utilize the MAC layer device disclosed by Edwards in the device of Walton.

5. Claims 10, 31, 56, 77, 102 and 123 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al (US 2005/0002468) in view of Edwards et al (US 2004/0059825) further in view of Kitchener et al (US 2002/0085643).

Regarding claim 10, the combination of Walton and Edwards discloses the device stated above. The combination discloses the MIMO system employs various forms of spatial diversity (Walton; paragraph 0029) and discloses switching between different communication modes (Walton: paragraph 0030). The different communication modes include a MIMO mode and a diversity mode that is determined when data rate requirements are low or when the SNR is low (Walton: paragraph 0030). The combination does not explicitly disclose the correlation measurement is an angle of arrival. Kitchener discloses the term "spatial diversity" is used herein to refer to the use of antenna spacing to obtain signals with low correlation for fast fading. The antenna spacing required for low correlation depends on angle of arrival and angle spread of the multipath. The lower the angle spread, the greater spacing required (paragraph 0056). The antenna spacing will contribute to the interference in the signal and therefore the SNR. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teaching of Kitchener into the combination of Walton and Edwards. The definition of "spatial diversity" explicitly discloses the angle of arrival as a

correlation measurement used in a MIMO system and this value will contribute to the SNR value computed.

Regarding claims 31, 56, 77, 102 and 123, Walton discloses the device and method of using the device stated above in paragraph 1. Walton discloses the MIMO system employs various forms of spatial diversity (paragraph 0029) and discloses switching between different communication modes (paragraph 0030). The different communication modes include a MIMO mode and a diversity mode that is determined when data rate requirements are low or when the SNR is low (paragraph 0030). The combination does not explicitly disclose the correlation measurement is an angle of arrival. Kitchener discloses the term "spatial diversity" is used herein to refer to the use of antenna spacing to obtain signals with low correlation for fast fading. The antenna spacing required for low correlation depends on angle of arrival and angle spread of the multipath. The lower the angle spread, the greater spacing required (paragraph 0056). The antenna spacing will contribute to the interference in the signal and therefore the SNR. It would have been obvious for one of ordinary skill in the art at the time of the invention to combine the teaching of Kitchener into the device of Walton. The definition of "spatial diversity" explicitly discloses the angle of arrival as a correlation measurement used in a MIMO system and this value will contribute to the SNR value computed.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Burd whose telephone number is (571) 272-3008. The examiner can normally be reached on Monday - Friday 9 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on (571) 272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2611

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



**KEVIN BURD
PRIMARY EXAMINER**

Kevin M. Burd
9/19/2007